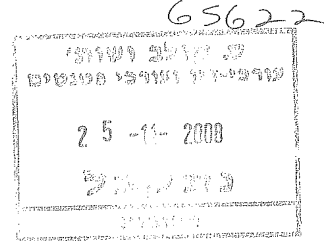65622

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

SANFORD T. COLB & CO.
P.O. BOX 2273
76122 REHOVOT
ISRAEL

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

	Date of mailing *(day/month/year)*

Applicant's or agent's file reference	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
65622	

International application No.	International filing date *(day/month/year)* 31 July 2008 (31.07.2008)
PCT/IL 08/01052	

Applicant AXXANA (ISRAEL) LTD.

---

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
   1211 Geneva 20, Switzerland, Facsimile No.: +41 22 740 14 35

   For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/US	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450	Lee W. Young
Facsimile No. 571-273-3201	PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/220 (January 2004)   *(See notes on accompanying sheet)*

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:

SANFORD T. COLB & CO.
P.O. BOX 2273
76122 REHOVOT
ISRAEL

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing (day/month/year)	**19 NOV 2008**

Applicant's or agent's file reference	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
65622	

International application No.	International filing date (day/month/year)
PCT/IL 08/01052	31 July 2008 (31.07.2008)

Applicant   AXXANA (ISRAEL) LTD.

---

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
   1211 Geneva 20, Switzerland, Facsimile No.: +41 22 740 14 35

   For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

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   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/US	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450	Lee W. Young
Facsimile No. 571-273-3201	PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 65622	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/IL 08/01052	International filing date *(day/month/year)* 31 July 2008 (31.07.2008)	(Earliest) Priority Date *(day/month/year)* 08 October 2007 (08.10.2007)
Applicant AXXANA (ISRAEL) LTD.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of ___3___ sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of:

      ☒ the international application in the language in which it was filed.

      ☐ a translation of the international application into _____ which is the language of
      a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

   ☒ the text is approved as submitted by the applicant.

   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

   ☐ the text is approved as submitted by the applicant.

   ☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

   a. the figure of the **drawings** to be published with the abstract is Figure No. _1_____

      ☒ as suggested by the applicant.

      ☐ as selected by this Authority, because the applicant failed to suggest a figure.

      ☐ as selected by this Authority, because this figure better characterizes the invention.

   b. ☐ none of the figures is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (April 2007)

Box No. IV	Text of the abstract (Continuation of item 5 of the first sheet)

A data processing method includes receiving data objects for storage by a primary storage device. A first instance of each of at least some of the received data objects is cached in a disaster-proof storage unit. A second instance of each received data object is sent for storage in a secondary storage device. A list of identifiers of the data objects that are cached in the disaster-proof storage unit at a given point in time is sent from the disaster-proof storage unit to the secondary storage device. Following an event that renders at least some of the data objects on the primary storage device inaccessible, a request sent to the secondary storage device to access a given data object is received. A selection is made, responsively to the list, to serve the cached first instance or the stored second instance of the given data object in response to the request.

A.   CLASSIFICATION OF SUBJECT MATTER
IPC(8) - G06F 11/00 (2008.04)
USPC - 714/6
According to International Patent Classification (IPC) or to both national classification and IPC

B.   FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
USPC: 714/6

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC: 714/2, 5, 6, 15, 100; 711/100, 118, 170 (keyword limited - see terms below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PubWEST(USPT,PGPB,EPAB,JPAB); DialogPRO(Engineering); Google Scholar
Search Terms: recovery, data, secondary storage, secondary memory, cache, list, network, wireless empty, request, duplicate, copy, mirror, disaster, read, write, delete, permanent, identifier etc.

C.   DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/0243609 A1 (Yang et al.) 03 November 2005 (03.11.2005) entire document especially: abstract, para [0020]-[0022], [0031], [0039], [0066]-[0069], [0076], [0085]-[0087], [0090]-[0105], [0110]-[0115], [0122]-[0134]	1-35
A	US 2007/0198613 A1 (Prahlad et al.) 23 August 2007 (23.08.2008) entire document	1-35

☐   Further documents are listed in the continuation of Box C.   ☐

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance		
"E"	earlier application or patent but published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed	"&"	document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
09 November 2008 (09.11.2008)	**19 NOV 2008**

Name and mailing address of the ISA/US	Authorized officer:
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (April 2007)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
SANFORD T. COLB & CO.
P.O. BOX 2273
76122 REHOVOT
ISRAEL

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	19 NOV 2008

Applicant's or agent's file reference	FOR FURTHER ACTION
65622	See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IL 08/01052	31 July 2008 (31.07.2008)	08 October 2007 (08.10.2007)

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - G06F 11/00 (2008.04)
USPC - 714/6

Applicant	AXXANA (ISRAEL) LTD.

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1. This opinion contains indications relating to the following items:

   ☒ Box No. I   Basis of the opinion

   ☐ Box No. II   Priority

   ☐ Box No. III   Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

   ☐ Box No. IV   Lack of unity of invention

   ☒ Box No. V   Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

   ☐ Box No. VI   Certain documents cited

   ☐ Box No. VII   Certain defects in the international application

   ☐ Box No. VIII   Certain observations on the international application

2. **FURTHER ACTION**

   If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

   If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

   For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	09 November 2008 (09.11.2008)	Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (April 2007)

Box No. I	Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

    [X] the international application in the language in which it was filed.

    [ ] a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

    a. type of material

    [ ] a sequence listing

    [ ] table(s) related to the sequence listing

    b. format of material

    [ ] on paper

    [ ] in electronic form

    c. time of filing/furnishing

    [ ] contained in the international application as filed

    [ ] filed together with the international application in electronic form

    [ ] furnished subsequently to this Authority for the purposes of search

4. [ ] In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	None	YES
	Claims	1-35	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-35	NO
Industrial applicability (IA)	Claims	1-35	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1-35 lack novelty under PCT Article 33(2) as being anticipated by US 2005/0243609 A1 to Yang et al. (hereinafter 'Yang').

As per claims 1 and 17, Yang teaches a data processing method and an apparatus for data processing, comprising: receiving data objects from a data source for storage by a primary storage device (para [0020], [0066]-[0069], [0076], such data storage systems include one or more data storage devices of the present invention, each of which are operably coupled to one or more workstations or computers or other digital processing device known to those skilled in the art via any one of a number of communication networks including but not limited to a LAN or a SAN; referring now to FIG. 2A, there is shown a data storage back-up system 50a including first and second data storage devices 100, 200 according to the present invention); caching a respective first instance of each of at least some of the received data objects in a disaster-proof storage unit, and sending a respective second instance of each received data object for storage in a secondary storage device (para [0021], [0066]-[0069], [0087], [0090]-[0095]; a second data storage device that is operably coupled to the first data storage device via any one of a number of communications networks known to those skilled in the art, such as a WAN; in the second write operation, the data is processed using Log-Structured File system (LSF) techniques so as to create one or more logs containing all of the transmitted data, Step 314; the logs being created are cached or buffered in the memory 130, more specifically the memory partition 131a, Step 316, such as the cache entries 500 illustrated in FIG. 6A); sending from the disaster-proof storage unit to the secondary storage device a list of respective identifiers of the data objects that are cached in the disaster-proof storage unit at a given point in time (para [0096], [0097], if it is time to replicate (Step 352 Yes) and there is data to replicate (Step 354, Yes), then the first data storage device or the program being executed thereon, is configured and arranged to read the data/logs from the SAPS device 140, to prepare the data/logs for transmission to the second data storage device 200, and to transmit the data/logs to the second data storage device, Steps 356, 358); following an event that renders at least some of the data objects on the primary storage device inaccessible at the given point in time, receiving a request sent to the secondary storage device to access a given data object; and choosing, at the secondary storage device, responsively to the list, to serve either the cached first instance or the stored second instance of the given data object in response to the request (para [0031], [0105], as the first and second and data storage devices 100, 200 are operably coupled to each other via a network 10, in the case there is a failure or loss of the data contained in the persistent device/disk 150 of the fist data storage device 100, the data from the second data storage device 200 can be made readily available to the user for continued operation; in addition, when the failed first data storage device 100 is recovered, the back-up storage system 50 of the present invention is configured and arranged so as to automatically cause the data stored at the second data storage device 200 to be recovered (e.g., written) to the persistent storage device 150 of the recovered first data storage device via the network communication links).

As per claims 2 and 18, Yang teaches the method of claim 1 and the apparatus of claim 17. Yang further teaches that sending the list comprises transmitting the list to the secondary storage device over a wireless link (para [0039], [0067], WAN shall be understood to mean and include any of a number of Wide Area Network(s) known to those skilled in the arts; the first and second data storage devices 100, 200 are operable coupled to each other via another network 10 (e.g., WAN or SAN) and in more particular embodiments, the communication links between the first and second data storage devices 100, 200 embody any of a number of network protocols known to those skilled in the art, such as iSCSI, TCP/IP, FC and the like).

As per claims 3 and 19, Yang teaches the method of claim 1 or 2 and the apparatus of claim 17 or 18. Yang further teaches that choosing to serve the first or second instance comprises serving the second instance responsively to verifying that the given data object does not appear in the list (para [0102], as this writing process can be interrupted by the next received data transmission from the first data storage device, the log buffers include headers to include an indication of the writing status; thus, a status indicator or header is provided to indicate when a buffer has been written to the persistent storage device/disk 150 (i.e., clean data) or is pending such writing (i.e., dirty data); ss such, the second data storage device 200 or the program being executed thereon causes each of the headers to be appropriately annotated with such indications).

--(please see supplemental box)--

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box No. V --- Reasoned Statement
2. Citations and explanations:

As per claims 4 and 20, Yang teaches the method of claim 1 or 2 and the apparatus of claim 17 or 18. Yang further teaches that choosing to serve the first or second instance comprises serving the second instance responsively to verifying that the given data object appears in the list and that the request specifies storage of the given data object.(para [0103], [0104], after re-assembling the data in the proper order for commitment and formatting it in the appropriate manner for storage in the persistent storage device/disk 150 of the second data storage device 200, the buffered data is written to the persistent storage device, step 378; thereafter, the process returns to determining if it is appropriate to de-stage the next set of logs/data set in the SAPS device 140; in this way, the data contained in the persistent storage device 150 of the first data storage device 100 is mirrored or replicated in the persistent storage device 150 of the second data storage device 200; in this regard, it should be noted that in more particular embodiments once data is initially mirrored or replicated in the second data storage device persistent storage device/disk 150, what is subsequently written to the persistent storage device are the changes to such data).

As per claims 5 and 21, Yang teaches the method of claim 1 or 2 and the apparatus of claim 17 or 18. Yang further teaches that choosing to serve the first or second instance comprises serving the first instance cached in the disaster-proof storage unit responsively to verifying that the given data object appears in the list and that the request specifies retrieval of the given data object (para [0085], [0112], if it is a read operation (Step 302, Read), then the program being executed on the CPU 120 in turn causes an I/O operation to be initiated by the first data storage device to read/retrieve the data being sought from the permanent or long term storage device/disk array 150, Step 304; following retrieval of the data, the first storage device 100 would encode or otherwise take the necessary and appropriate steps so that the data is communicated over the network 4 back to the workstation 2 and thus to the user/requestor that had initiated the I/O operation/command, Step 306).

As per claims 6 and 22, Yang teaches the method of claim 5 and the apparatus of claim 21. Yang further teaches that serving the first instance comprises requesting the disaster-proof storage unit to send the cached first instance to the secondary storage device with high priority (para [0098], [0127], [0128], the data in the SAPS device/disk 140 of the first data storage device 100 is read out sequentially in log format to form batches for transmission to the second data storage device 200 for purposes of remote mirroring or replicating; there is shown a process performed by the second data storage device 200 to receive the encrypted data log transmissions (or the compressed and/or encrypted data log transmissions) from the first data storage device 100).

As per claims 7 and 23, Yang teaches the method of claim 5 and the apparatus of claim 21. Yang further teaches that the disaster-proof storage unit stores multiple first instances of the given object having respective creation times, and wherein serving the first instance comprises serving the first instance whose creation time is most recent among the multiple first instances(para [0098], [0101], the data in the SAPS device/disk 140 of the first data storage device 100 is read out sequentially in log format to form batches for transmission to the second data storage device 200 for purposes of remote mirroring or replicating; because data/logs can be generated with the data out of order from which it was received from the user's workstation, the data in the log buffers 510 is processed and recombined so the data is in the proper order prior to its commitment to storage in the persistent storage device/disk 150, Step 376).

As per claims 8 and 24, Yang teaches the method of claim 1 or 2 and the apparatus of claim 17 or 18. Yang further teaches that when the request specifies storage of the given data object, choosing to serve the first or second instance comprises storing the given data object in the secondary storage device before fully receiving the list, temporarily recording an identifier of the given data object, and, upon fully receiving the list, deleting the identifier from the list (para [0099], [0127]-[0134], after the data storage back-up system 50 is initially configured for operation, the second data storage device 200 more particularly the program being executed thereon, is configured and arranged so as to start the process involved with receiving the data being flushed or transmitted from the first data storage devices (as described above in regards to FIG. 7F) to the second data storage device 200, Step 1600; the second data storage device 200 receives the encrypted log (or the compressed and/or encrypted log) from the first data storage device 100, Step 1602).

As per claim 9 and 25, Yang teaches the method of claim 1 or 2 and the apparatus of claim 17 or 18. Yang further teaches that sending the cached first instances to the secondary storage device after sending the list (para [0127]-[0134], the second data storage device 200 receives the encrypted log (or the compressed and/or encrypted log) from the first data storage device 100, Step 1602; and determines if the log buffer clean list is empty, Step 1604; if it is determined that the clean list is empty (Step 1604, Yes), the second data storage device 200 flushes logs to the SAPS device/disk 140 for the second data storage device 200, Step 1606 until the clean list is not empty; after so flushing the logs (Step 1606) or if it is determined that the clean list is not empty (Step 1604, No) then one log buffer is allocated from the clean list, Step 1608; the encrypted log is decrypted (or decompressed and decrypted if compressed and encrypted) and written to log buffer, Step 1612; and added to the dirty list, Step 1612; thereafter the process returns to step 1602).

As per claims 10 and 26, Yang teaches the method of claim 9 and the apparatus of claim 25. Yang further teaches that choosing to serve the first or second instance is performed before all the cached first instances are received at the secondary storage device (para [0127]-[0134], the second data storage device 200 receives the encrypted log (or the compressed and/or encrypted log) from the first data storage device 100, Step 1602; and determines if the log buffer clean list is empty, Step 1604; if it is determined that the clean list is empty (Step 1604, Yes), the second data storage device 200 flushes logs to the SAPS device/disk 140 for the second data storage device 200, Step 1606 until the clean list is not empty; after so flushing the logs (Step 1606) or if it is determined that the clean list is not empty (Step 1604, No) then one log buffer is allocated from the clean list, Step 1608; the encrypted log is decrypted (or decompressed and decrypted if compressed and encrypted) and written to log buffer, Step 1612; and added to the dirty list, Step 1612; thereafter the process returns to step 1602).

--(please see next supplemental box)--

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Preceding Supplemental Box
Box No. V --- Reasoned Statement
2. Citations and explanations:

As per claims 33 and 34, Yang teaches an apparatus for data processing and a system comprising a data source; a primary storage device; a secondary storage device (para [0066], there is shown a data storage back-up system 50a including first and second data storage devices 100, 200 according to the present invention, the first data storage device 100 is operably coupled via a network 4 (e.g., LAN) to a plurality or more of workstations 2, computers or other digital processing devices so that data or I/O requests (i.e., reads or writes) from a user are communicated to and processed within the first data storage device), the apparatus comprising: a mirroring processor, which is configured to receive data objects from a data source, to send respective first instances of the received data objects for storage in a primary storage device and to send respective second instances of the received data objects for storage in a secondary storage device(para [0020], [0066]-[0069], [0076], such data storage systems include one or more data storage devices of the present invention, each of which are operably coupled to one or more workstations or computers or other digital processing device known to those skilled in the art via any one of a number of communication networks including but not limited to a LAN or a SAN; referring now to FIG. 2A, there is shown a data storage back-up system 50a including first and second data storage devices 100, 200 according to the present invention; a second data storage device that is operably coupled to the first data storage device via any one of a number of communications networks known to those skilled in the art, such as a WAN); a disaster-proof storage unit, which is coupled to cache the respective first instance of each of at least some of the received data objects and to transmit a list of respective identifiers of the data objects that are cached in the disaster-proof storage unit at a given point in time (para [0021], [0066]-[0069], [0087], [0090]-[0097]; in the second write operation, the data is processed using Log-Structured File system (LSF) techniques so as to create one or more logs containing all of the transmitted data, Step 314; the logs being created are cached or buffered in the memory 130, more specifically the memory partition 131a, Step 316, such as the cache entries 500 illustrated in FIG. 6A; if it is time to replicate (Step 352 Yes) and there is data to replicate (Step 354, Yes), then the first data storage device or the program being executed thereon, is configured and arranged to read the data/logs from the SAPS device 140, to prepare the data/logs for transmission to the second data storage device 200, and to transmit the data/logs to the second data storage device, Steps 356, 358); and a recovery processor, which is configured, following an event that renders at least some of the data objects on the primary storage device inaccessible at the given point in time, to receive the list from the disaster-proof storage unit and to forward the list to the secondary storage device, so as to enable the secondary storage device to choose, responsively to the list, to respond to a request to access a given data object by serving either the cached first instance or the stored second instance of the given data object (para [0031], [0105], as the first and second and data storage devices 100, 200 are operably coupled to each other via a network 10, in the case there is a failure or loss of the data contained in the persistent device/disk 150 of the fist data storage device 100, the data from the second data storage device 200 can be made readily available to the user for continued operation; in addition, when the failed first data storage device 100 is recovered, the back-up storage system 50 of the present invention is configured and arranged so as to automatically cause the data stored at the second data storage device 200 to be recovered (e.g., written) to the persistent storage device 150 of the recovered first data storage device via the network communication links).

As per claim 35, Yang teaches a computer software product for data processing, for use in a system that receives data objects from a data source, sends respective first instances of the data objects for storage in a primary storage device and respective second instances of the data objects for storage in a secondary storage device (para [0020], [0066]-[0069], [0076], such data storage systems include one or more data storage devices of the present invention, each of which are operably coupled to one or more workstations or computers or other digital processing device known to those skilled in the art via any one of a number of communication networks including but not limited to a LAN or a SAN; referring now to FIG. 2A, there is shown a data storage back-up system 50a including first and second data storage devices 100, 200 according to the present invention; a second data storage device that is operably coupled to the first data storage device via any one of a number of communications networks known to those skilled in the art, such as a WAN) and includes a disaster-proof storage unit, which caches the respective first instance of each of at least some of the received data objects and sends to the secondary storage device a list of respective identifiers of the data objects that are cached in the disaster-proof storage unit at a given point in time (para [0021], [0066]-[0069], [0087], [0090]-[0097]; in the second write operation, the data is processed using Log-Structured File system (LSF) techniques so as to create one or more logs containing all of the transmitted data, Step 314; the logs being created are cached or buffered in the memory 130, more specifically the memory partition 131a, Step 316, such as the cache entries 500 illustrated in FIG. 6A; if it is time to replicate (Step 352 Yes) and there is data to replicate (Step 354, Yes), then the first data storage device or the program being executed thereon, is configured and arranged to read the data/logs from the SAPS device 140, to prepare the data/logs for transmission to the second data storage device 200, and to transmit the data/logs to the second data storage device, Steps 356, 358), the product comprising a tangible computer-readable medium, in which program instructions are stored, which instructions, when read by a computer, cause the computer, following an event that renders at least some of the data objects on the primary storage device inaccessible at the given point in time, to receive a request sent to the secondary storage device to access a given data object and to choose, responsively to the list, to serve either the cached first instance or the stored second instance of the given data object in response to the request.(para [0031], [0105], as the first and second and data storage devices 100, 200 are operably coupled to each other via a network 10, in the case there is a failure or loss of the data contained in the persistent device/disk 150 of the fist data storage device 100, the data from the second data storage device 200 can be made readily available to the user for continued operation; in addition, when the failed first data storage device 100 is recovered, the back-up storage system 50 of the present invention is configured and arranged so as to automatically cause the data stored at the second data storage device 200 to be recovered (e.g., written) to the persistent storage device 150 of the recovered first data storage device via the network communication links).

Claims 1-35 have industrial applicability as defined by PCT Article 33(4), because the subject matter claimed can be made or used in industry.

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under Article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article," "Rule" and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*, Volume I/A, Annexes B1 and B2).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority has declared, under Article 17(2), that no international search report would be established (see *PCT Applicant's Guide*, Volume I/A, paragraph 296).

What parts of the international application may be amended ?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Preliminary Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When ? Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments ?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How ? Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments ?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.